ON TO 2050

Stormwater and Flooding

ON TO 2050 Strategy Paper

Calumet Stormwater Collaborative

September 8, 2017

CMAP

Agenda

- Brief recap of ON TO 2050 Development and Purpose of strategy paper
- Regional Flooding Susceptibility Index
- Draft policy framework
- Next steps

ON TO 2050 Plan Development

- Per CMAP Board's direction, build upon the strong foundation that GO TO 2040 provides

- Explore limited new policy areas supportive of CMAP's land use and transportation responsibilities

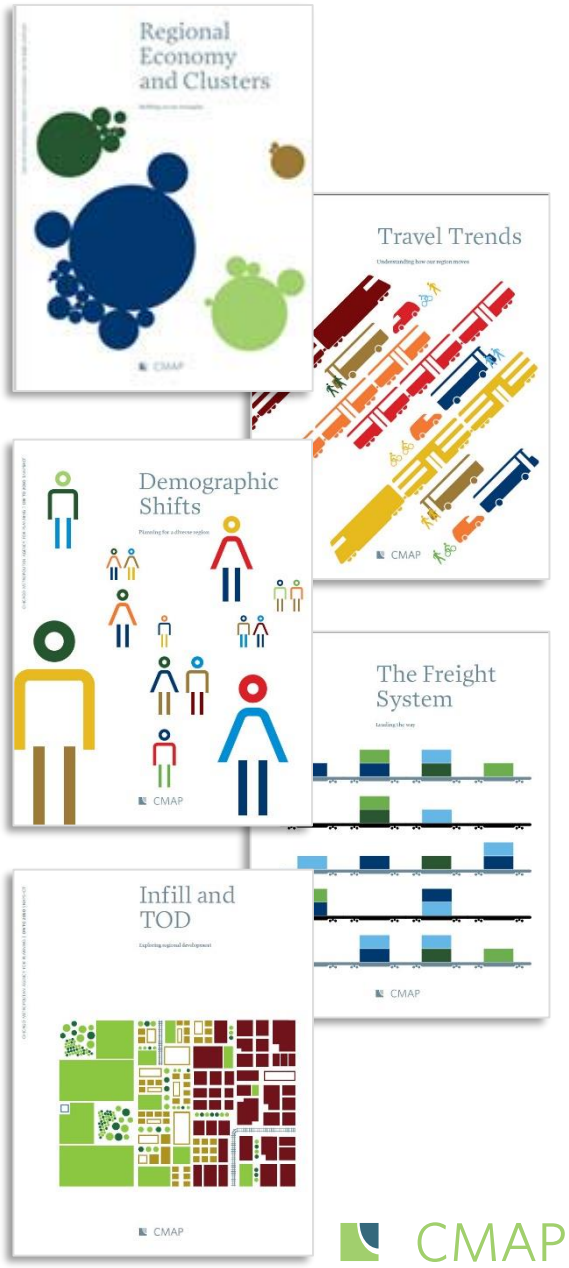
- Strive for greater specificity in the plan's policies:
  - Through refinement of existing policies
  - Through development of a place-based approach that provides more guidance for implementers

ON TO 2050 Snapshot Reports

Snapshot Reports

Data-driven existing conditions and trends analysis summarized in a brief graphical report. Planned topics include:

- **Regional Economy and Clusters**
- **Travel Trends**
- **Demographic trends**
- **Freight System**
- **Infill and Transit Oriented Development Trends**
- Non-motorized Transportation trends
- Local Food
- Highway System trends
- Transit Network trends
- Natural Resources trends
- Placemaking



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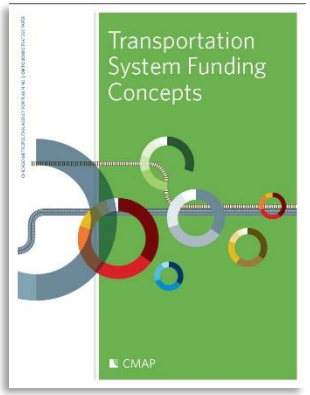
ON TO 2050 Strategy Papers

Strategy Papers

Exploration of refinements to GO TO 2040 policies or new policy areas in a medium-length narrative format. Planned topics include:

- **Integrating Green Infrastructure**
- **Transportation System Funding Concepts**
- **Climate resilience**
- **Tax policies and land use trends**
- **Highway operations**
- **Reinvestment and infill**
- **Lands in transition**
- **Housing supply and affordability**
- **Inclusive growth**
- **Energy**
- Asset management
- Transportation technology
- Municipal capacity
- Water Resources
- Stormwater and flooding
- Regional economy
- Transit modernization
- Economic resilience
- Public health



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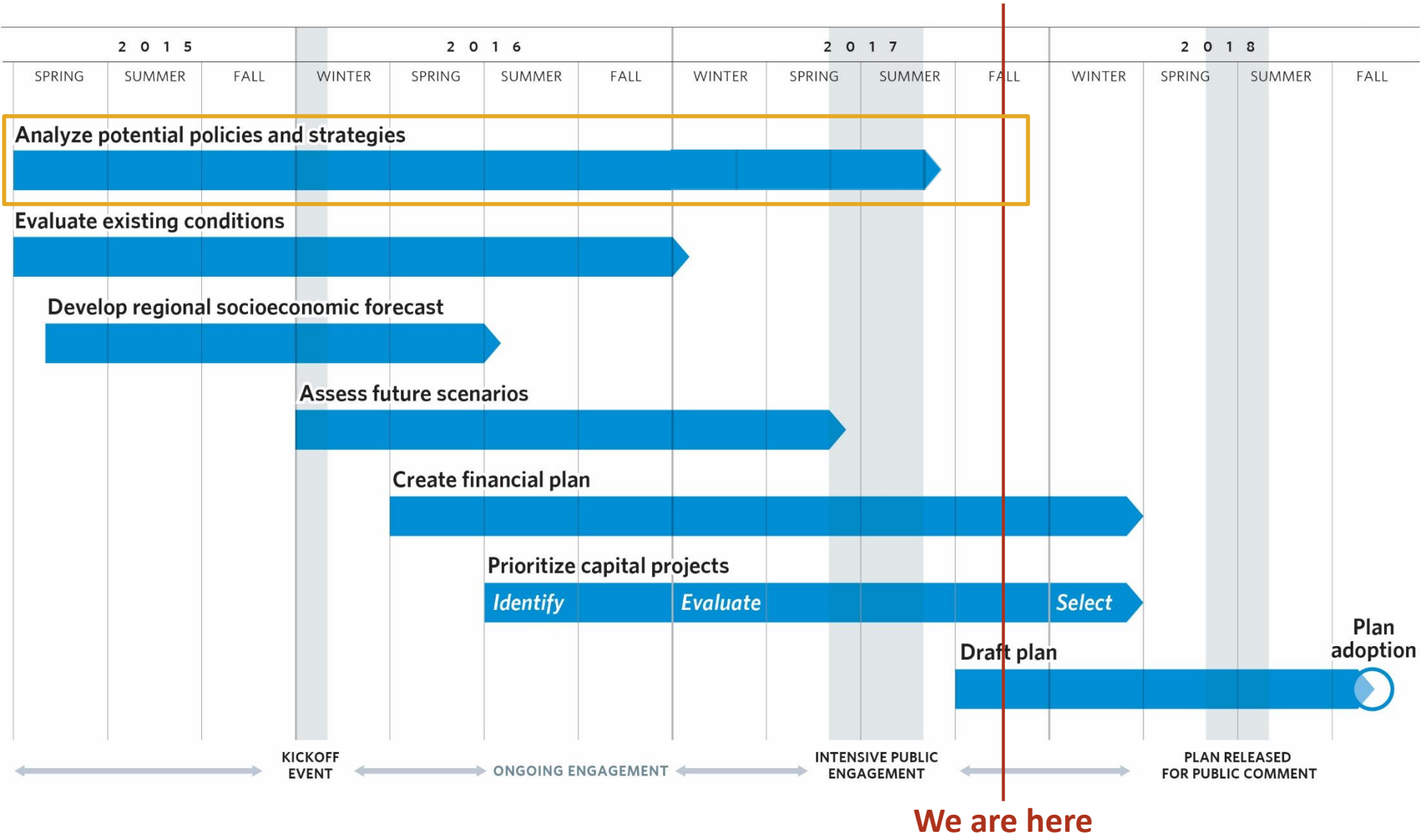
ON TO 2050 Plan Development Timeline



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Stormwater and flooding strategy paper

- Integrate a better understanding of the extent and costs of both urban and riverine flooding, as well as how those could grow due to climate change, into ON TO 2050.
- Identify the barriers to effective stormwater management and develop policy approaches to reduce flooding impacts.
- Focus efforts in areas of greatest need in the region.
- Build connections with other policy work being developed for the next plan.

Regional Flooding Susceptibility Analysis

Purpose

Identify priority areas across the region for flooding mitigation activities.

Potential applications of the indexes

- Help CMAP focus Local Technical Assistance Projects.
- May help coordinate partners:
  - Inform open space preservation and restoration decisions?
  - Inform vulnerability assessments?
  - Other activities?

Regional Flooding Susceptibility Indexes

What it is:

- Uses flooding-related factors to identify priority areas based on past flooding locations
- Study area:
  - Developed areas in the CMAP region
  - Riverine Index: areas within FEMA 100-yr floodplain/MWRD 100-yr inundation
  - Urban Index: outside of these areas

What it's not:

- Floodplain Inundation mapping
- Sewer System modeling
- Rainfall-runoff modeling

Frequency Ratio Approach

Five Step Process

Step 1: Assemble & categorize reported flooding locations

Step 2: Assemble & categorize potential flooding-related factors

Step 3: Calculate the frequency ratio for factor categories

Step 4: Add frequency ratios for selected factors

Step 5: Access accuracy of indexes

Frequency Ratio Approach

Statistical method to identify higher risk areas based on the observed relationship between reported flooding locations and flooding-related factors.

$$\frac{Percent\ of\ flood\ events\ in\ factor\ category}{Percent\ of\ study\ area\ in\ factor\ category} = Frequency\ ratio$$

Frequency Ratio Approach

Calculation example:
Combined Sewer Service Areas for the Urban Index

Factor	Categories	Percent (%) of Study Area	Percent (%) of Flood Locations	Frequency Ratio
Combined Sewer Service Area	Present	15.8%	69.6%	4.41
	Absent	84.2%	30.4%	0.36

$$\frac{69.6\%\ of\ flood\ locations\ in\ "Present"\ category}{15.8\%\ of\ study\ area\ is\ "Present"\ category} = FR\ of\ 4.41$$

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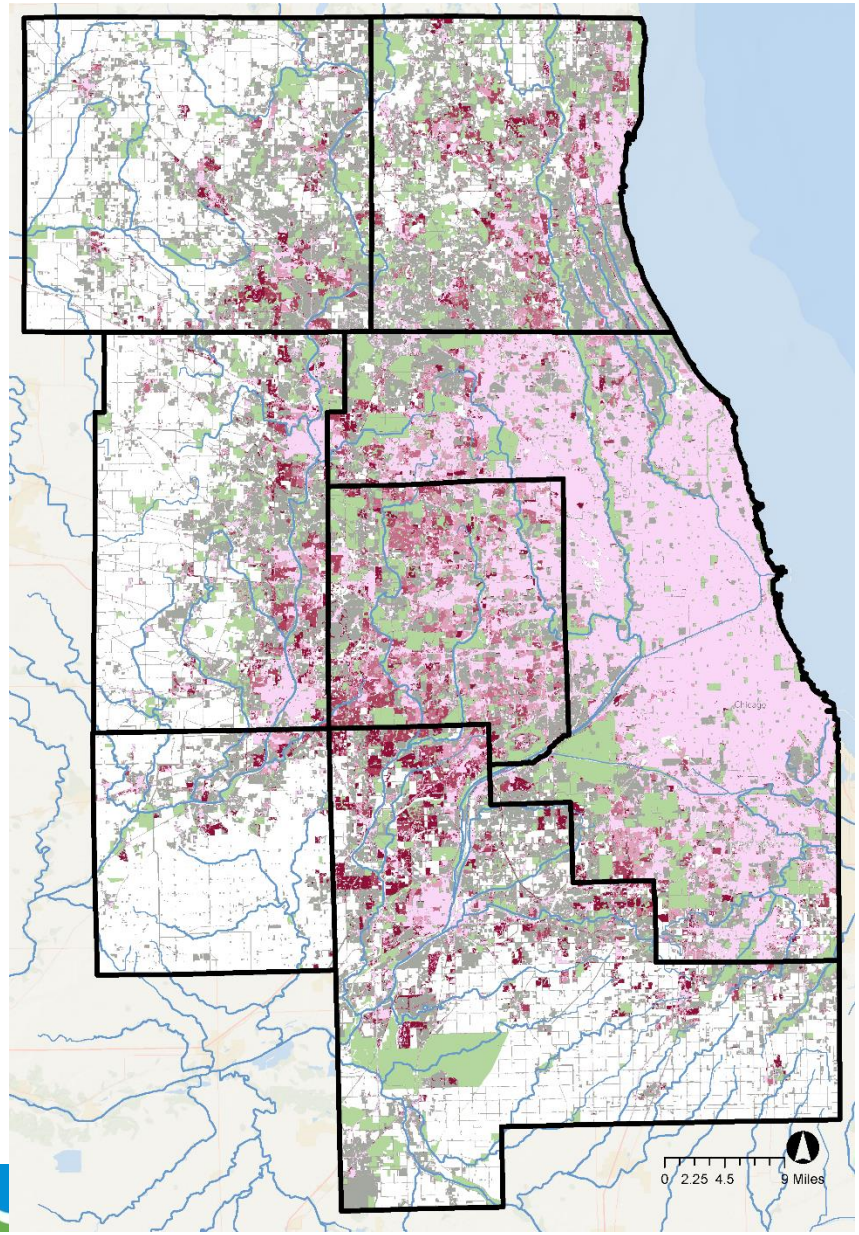
Urban Flooding Susceptibility Index



Age of First Development

	Categories	Percent (%) Study Area
1	Prior to 1974	41.2%
2	1974-1982	5.4%
3	1982-1992	3.3%
4	1992-2002	5.0%
5	2002-2012	4.6%
6	Undeveloped/ post-2012	40.6%

Urban Flooding Susceptibility Index

Age of First Development

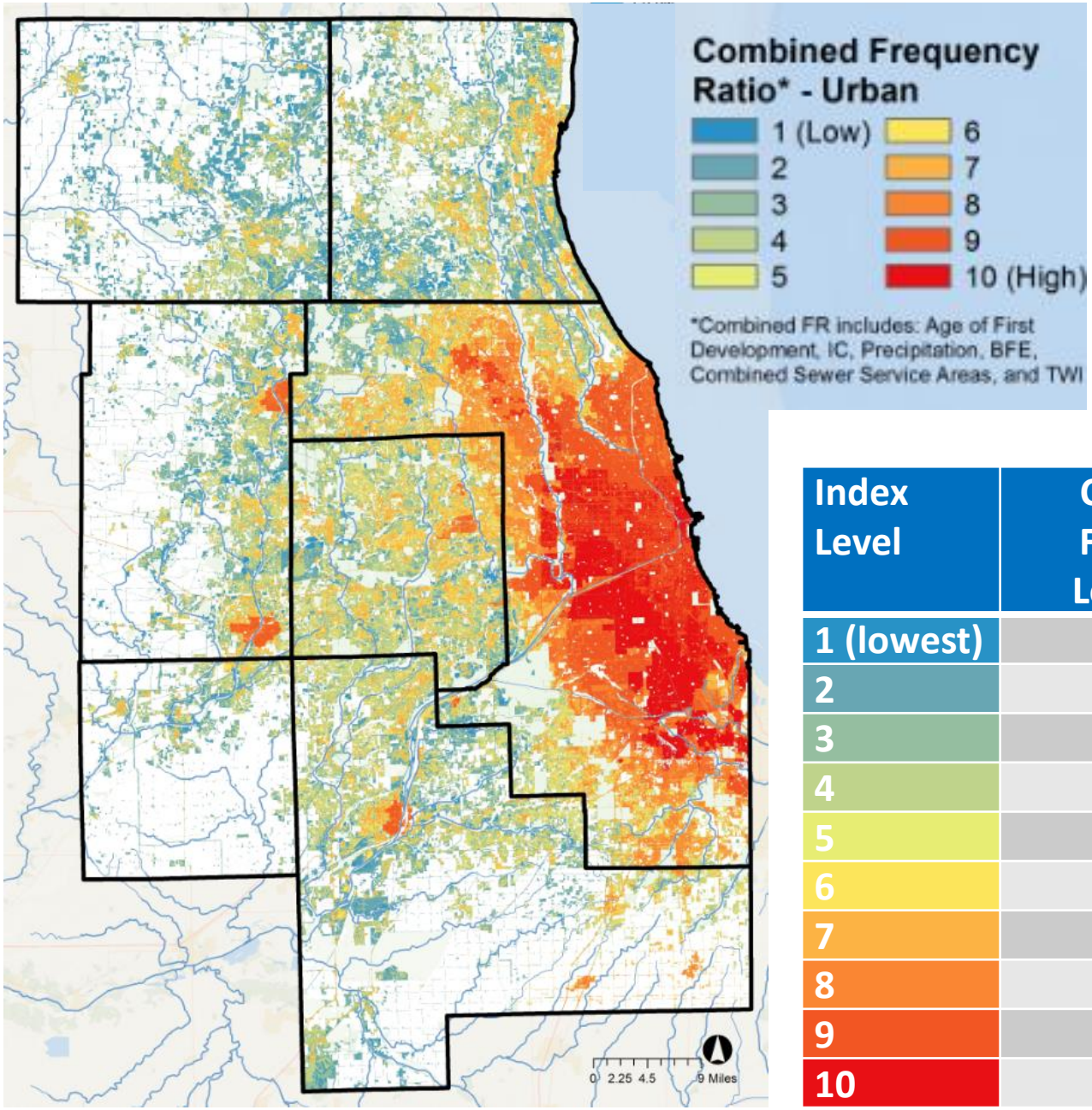
	Categories	Percent (%) of Study Area	Percent (%) of Flood Locations	Frequency Ratio
1	Prior to 1974	41.2%	84.7%	2.06
2	1974-1982	5.4%	2.9%	0.54
3	1982-1992	3.3%	0.89%	0.27
4	1992-2002	5.0%	1.05%	0.21
5	2002-2012	4.6%	0.99%	0.22
6	Undeveloped/ post-2012	40.6%	9.48%	0.23

Urban Flooding Susceptibility Index

Urban Analysis

- All areas **outside** of the 100-yr FEMA floodplain or MWRD 100-yr Inundation area
- Flooding-related factors:
  - Topographic Wetness Index
  - Combined Sewer Service Area
  - Elevation differential between property and nearest FEMA BFE
  - Impervious Cover
  - Age of First Development
  - Precipitation variation

Urban Flooding Susceptibility Index



Accuracy assessment using validation data

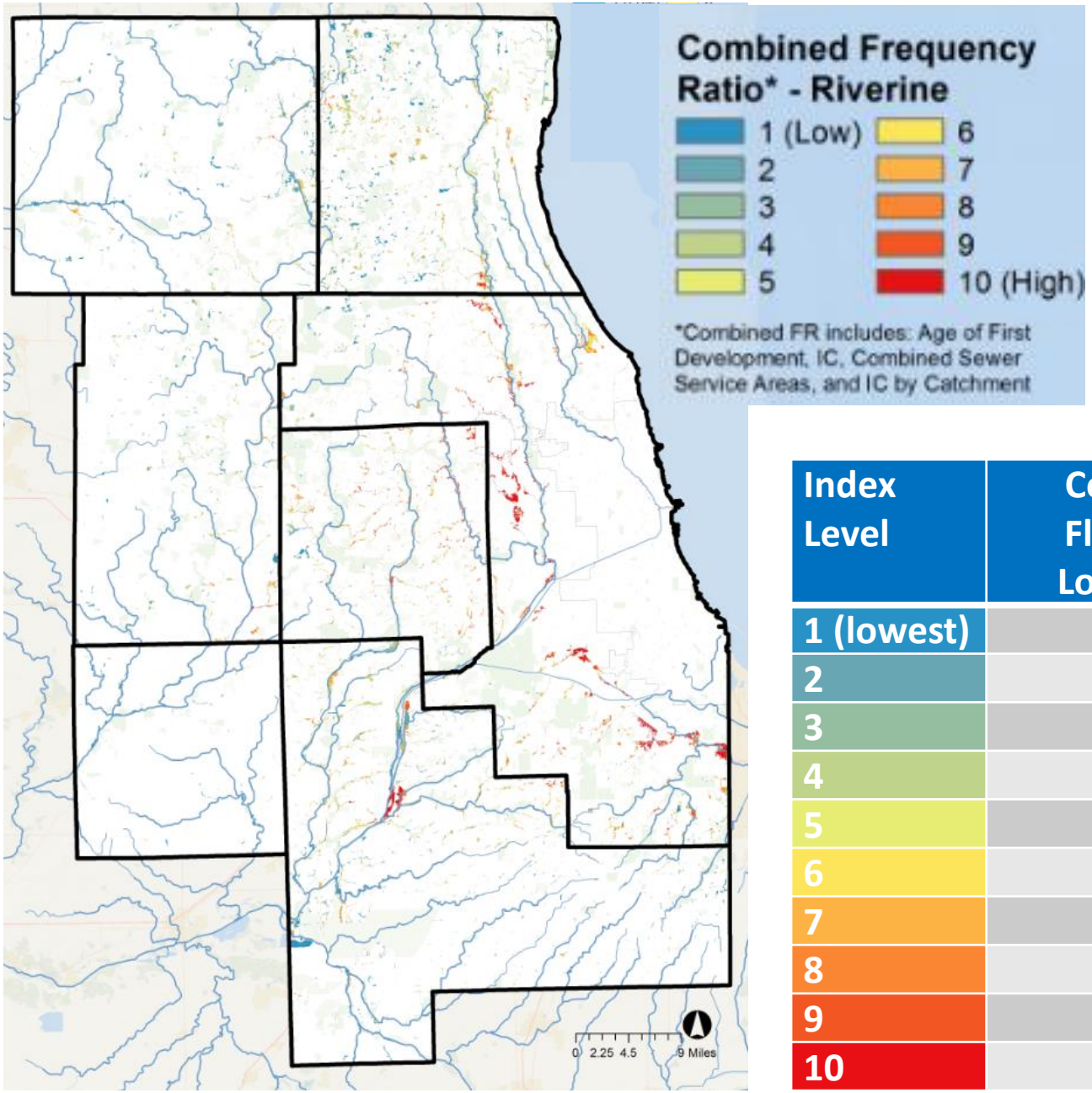
Index Level	Count of Flooding Locations	Flood Occurrence (%)
1 (lowest)	406	0.9%
2	625	1.3%
3	896	1.9%
4	1,113	2.4%
5	1,360	2.9%
6	1,602	3.4%
7	2,504	5.4%
8	4,945	10.6%
9	8,719	18.7%
10	24,460	52.5%

Riverine Flooding Susceptibility Index

Riverine Analysis

- All areas **inside** the 100-yr floodplain or the MWRD 100-yr Inundation area.
- Flooding-related factors:
  - Combined Sewer Service Area
  - Impervious Cover
  - Impervious Cover by NHD+ Catchment
  - Age of First Development

Riverine Flooding Susceptibility Index



Accuracy assessment using validation data

Index Level	Count of Flooding Locations	Flood Occurrence (%)
1 (lowest)	43	1.4%
2	94	3.0%
3	57	1.8%
4	170	5.5%
5	240	7.7%
6	238	7.6%
7	288	9.2%
8	378	12.1%
9	487	15.6%
10	1124	36.0%

Policy Framework

Five themes

1. Identify and communicate flooding risk and exposure
2. Advance planning efforts to reduce current and future risk
3. Invest and maintain grey and green infrastructure
4. Increase resiliency of the transportation system
5. Enhance coordination and information sharing

Policy Framework

Key questions

1. Are we missing any major policy recommendations?
2. What are some coordination activities you think would be essential at the regional scale?

Policy Framework

1. Identify and communicate flooding risk

- Update precipitation data and floodplain maps
- Continue advancing watershed and sewer modeling efforts
- Enhance understanding of urban flooding risk
- Assess vulnerability of populations, communities, and critical assets
- Communicate risk and exposure to residents, businesses

Policy Framework

2. Advance planning efforts to reduce current and future risk

- Continue advancing county stormwater management ordinances
- Update municipal plans and ordinances to better manage stormwater
- Coordinate flood reduction and water quality improvement efforts
- Enhance floodplain management compliance

Policy Framework

3. Invest and maintain grey and green infrastructure

- Maintain capacity of existing drainage assets
- Build capacity and public support for green infrastructure
- Establish dedicated revenue streams for stormwater management
- Encourage coordinated investments at all scales
- Prepare for effective use of federal disaster assistance

Policy Framework

4. Increase resiliency of the transportation system

- Conduct vulnerability assessments to inform transportation planning
- Integrate stormwater management in transportation planning and investments
- Develop and enhance operational strategies to maintain performance

Policy Framework

5. Enhance coordination and governance

- Improve coordination across county stormwater agencies
  - Share best practices and data
  - Advance watershed and sewer modeling efforts
  - Update county stormwater management ordinances

Next steps

Strategy Paper

- **September**
  Currently under CMAP internal review
- **October**
  Revised Draft to CMAP Environment and Natural Resources Committee
- **November**
  Final paper released

Regional Flooding Susceptibility Index

- **Fall/Winter**
  Continue refinement with partners

Small group discussion

Key questions

1. Are we missing any major policy recommendations?
2. What are some coordination activities you think would be essential at the regional scale?

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Comments or Questions

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